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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALEXANDER DAVID SCOTT ELLIN and
JAMES REYNOLDS HENSHAW

Appeal 2010-009287
Application 10/500,716
Technology Center 3700

Before STEVEN D.A. McCARTHY, GAY ANN SPAHN and JOHN W. MORRISON, *Administrative Patent Judges*.

McCARTHY, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

The Appellants[1] appeal under 35 U.S.C. § 134 from the Examiner's final decision rejecting claims 1-36, 42 and 43. The Examiner rejects under 35 U.S.C. § 103(a) claims 1-14, 19-32, 42 and 43 as being unpatentable over

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[1] The Appellants identify the real party in interest as Renishaw PLC.

the Appellants' Admitted Prior Art ("the AAPA"), Michel (DE 196 08 937 A1, publ. Sep. 12, 1996)[2] and Neev (US 6,156,030, issued Dec. 5, 2000); claims 15-17 and 33-35 as being unpatentable over the AAPA, Michel, Neev and Gallagher (US 2003/0015672 A1, publ. Jan. 23, 2003); and claims 18 and 36 as being unpatentable over the AAPA, Michel, Neev and Neiheisel (US 5,736,709, issued Apr. 7, 1998). An oral hearing was held on November 6, 2012. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Claims 1 and 19 are independent. Claim 1 is illustrative:

> 1. A method of producing precision marks for a metrological scale, employing apparatus including:
>
> a scale substrate to be marked at repeated instants by a laser and thereby forming a metrological scale;
>
> a laser operable so as to provide light pulses for forming scale markings at the substrate;
>
> a displacement device for causing relative displacement between the substrate and the location at which the light is incident on the substrate; and
>
> a controller for controlling the relative displacement and the laser,
>
> the method comprising the steps, in any suitable order, of:
>
> operating the displacement mechanism so as to cause relative

[2] References to Michel will be to the Official Translation prepared by FLS, Inc. in or about November 2009.

> displacement between the substrate and the light;
>
> using the controller to control the relative displacement and to operate the laser so as to produce light pulses at the substrate;
>
> characterised in that:
>
> the laser produces a plurality of ultra-short pulses[3] of a fluence at the substrate such that the metrological scale marks are formed by laser ablation, wherein the plurality of ultra-short pulses have a duration such that the scale markings are formed on the scale substrate by a laser ablation mechanism in which the molten stage is omitted.

Independent claim 19 recites an apparatus for producing precision marks for a metrological scale including, *inter alia*, a laser,

> characterised in that the pulses of light produced by the laser are ultra-short pulses of a fluence at the substrate such that the metrological scale marks are formed by laser ablation, wherein the plurality of ultra-short output pulses have a duration such that the scale markings are formed on the scale substrate by a laser ablation mechanism in which the molten stage is omitted.

The AAPA appears primarily at page 1, line 31 through page 2, line 29 of the Specification. The Examiner summarizes the AAPA as describing "[1] known production of measurement scale using a laser, [2] use of a reference to correct deficiencies, [3] marking perpendicular to the laser

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[3] The Specification defines "ultra-short pulses" as pulses having pulse lengths below approximately 4 picoseconds. (*See* Spec. 2, ll. 21-27).

travel direction, and [4] known laser solid to gaseous state ablation performed at below 4 picoseconds pulse length." (Ans. 4 (reference numerals added)). The Appellants' Specification supports all four of the Examiner's findings. (*See* Spec. 1, ll. 31-32; Spec. 1, l. 34 – 2, l. 1; Spec. 2, ll. 6-8; and Spec. 2, ll. 14-17 and 21-29). On the other hand, the Examiner finds that the "AAPA does not describe forming a scale by laser ablation (direct solid to vapor phase transition)." (Ans. 4).

Neev describes the use of a laser to ablate material. (Neev, col. 7, ll. 7-8). In fact, both the AAPA and Neev describe laser ablation mechanisms using high energy, ultra-short pulses (that is, pulses of length less than 4 picoseconds). Neither suggests exploiting this mechanism to produce scale markings, however. In particular, the only examples of materials which Neev appears to suggest ablating with a laser producing a pulse width of 4 picoseconds or less are biological tissues. (*See*, *e.g.*, Neev, col. 28, ll. 56-63 and col. 29, ll. 20-34; *see also id.*, col. 5, ll. 3-18).

Michel describes forming tags (that is, index markings) using high-energy laser from an excimer laser. (Michel 2, l. 20 – 3, l. 2). Michel discloses applying the tag (or scale marked) layer T_1 "in the usual way" as a gold layer on a steel strip as S_1 or, alternatively, on a highly polished surface T_2 on the steel strip. (Michel 3, ll. 16-20). Michel teaches that:

> The high-energy radiation can be generated with the use of the previously mentioned excimer laser. For manufacturing the separating structure [or divisional structure] TS_1 or TS_2 in the form of a grid, the highly reflective surface of the gold layer T_1 or the polished surface T_2 of the substrate S_2 is melted with the use of short laser pulses with a duration of about 20 ns [that is, about 20,000 picoseconds], after which, in the pulse pause, the

> surface T_1, T_2 immediately solidifies again. *In order to prevent energy dissipation from the processing area during the duration of the laser pulse, pulses of a clearly shorter duration can be used.* The solidified melt has a different roughness and thus different optical properties than the highly reflective surfaces T_1, T_2 and a separating structure TS_1, TS_2 with reduced reflectivity develops.

(Michel 3, l. 21 – 4, l. 7 (italics added)).

In other words, Michel teaches forming scale markings by melting and re-solidifying portions of the polished surface of a marked layer in order to change the optical properties of the marked layer. (*See* Michel 3, l. 21 – 4, l. 7 (italics added)). On the other hand, the Examiner cites the AAPA and Neev as teaching the use of lasers to ablate materials. (Ans. 4). Neev, in fact, suggests that one advantage of Neev's teachings is that melting and boiling are minimized. (*See, e.g.*, Neev, col. 24, ll. 10-15).

As the Appellants point out, Michel appears to teach the desirability of what, in other contexts, might have been viewed as product defects. (*See* Br. 16). In view of these differences, the Examiner's conclusion that the "use of a low thermal transfer to the workpiece by performing ultra-short pulse laser ablation would have been obvious at the time applicant's invention was made to a person having ordinary skill in the art in order to minimize the heat affected zone (HAZ) and thereby reduce product defects" (Ans. 4) is not persuasive.

Based on this reasoning, we do not sustain the rejection of claims 1-14 and 42 under § 103(a) as being unpatentable over the AAPA, Michel and Neev. In addition, the Examiner has not provided reasoning with some rational underpinning to show that one of ordinary skill would have reason to provide an apparatus for producing precision marks for a metrological

scale with a laser capable of producing ultra-short pulses, we do not sustain the rejection of claims 19-32 and 43 under § 103(a) as being unpatentable over the AAPA, Michel and Neev.

With respect to the rejection of claims 15-17 and 33-35, the Examiner finds that "[d]isplacement is described by Gallagher." (Ans. 5). The Examiner concludes that the "the use thereof in displacement for laser ablation of marks" would have been obvious "because automated movement control provides controlled regular ablation." (*Id.*) This finding and reasoning does not remedy the deficiencies in the combined teachings of the AAPA, Michel and Neev as applied to independent claims 1 and 19. We do not sustain the rejection of claims 15-17 and 33-35 under § 103(a) as being unpatentable over the AAPA, Michel, Neev and Gallagher.

With respect to the rejection of claims 18 and 36, the Examiner finds that "Neiheisel describes laser ablation and shows (Figure 10b) the well known elliptical spot." (Ans. 6). The Examiner concludes that the "elliptical spot" would have been obvious "because it provides a narrower profile for precision shaped etching." (*Id.*) This finding and reasoning does not remedy the deficiencies in the combined teachings of the AAPA, Michel and Neev as applied to independent claims 1 and 19. We do not sustain the rejection of claims 15-17 and 33-35 under § 103(a) as being unpatentable over the AAPA, Michel, Neev and Neiheisel.

DECISION

We REVERSE the Examiner's decision rejecting claims 1-36, 42 and 43.

REVERSED

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